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10/526,981	06/07/2005	Philip Summersgill	P70416US0	7989

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EXAMINER	
MIRABEAU, MONIQUE A	

ART UNIT	PAPER NUMBER
4112	

MAIL DATE	DELIVERY MODE
08/19/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/526,981	SUMMERSGILL ET AL.	
	Examiner	Art Unit	
	MONIQUE MIRABEAU	4112	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 June 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03/07/2005* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *08/04/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Summary

1. This is the initial Office action based on the 10/526, 981 application filed June 07, 2005.

2. Claims 1-19 are pending and have been fully considered.

Drawings

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p) (5) because they include the following reference character(s) not mentioned in the description: Figure 8, reference number 62. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

4. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the subject matter in claims 1-19 of the modular microfluidic system, claims 1, 8, 10-12, and 17-19 of the

microfluidic module and claim 9 of the microfluidic devices must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Information Disclosure Statement

5. The information disclosure statement filed August 04, 2005 fails to comply with 37 CFR 1.98(a)(3) because it does not include a concise explanation of the relevance, as it is presently understood by the individual designated in 37 CFR 1.56(c) most knowledgeable about the content of the information, of each patent

listed that is not in the English language. It has been placed in the application file, but the information referred to therein has not been considered.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims **1, 5-7, 10, 15** and **17** are rejected under 35 U.S.C. 102(b) as being clearly anticipated by CHERUKURI et al (US 6, 331, 439).

8. CHERUKURI et al. teaches a device for selective distribution of liquids. CHERUKURI et al. discloses a microelectronic and fluidic array/device array (100) (modular microfluidic system) comprising at least one feedthru plate/center distribution plate/ bottom cell plate (300, 310 and 320, see fig. 3 and 5) (base board) having a plurality of fluidly linked supply apertures (302) (col. 6, lines 52-54) on one (or both) sides thereof (col. 6, lines 49-51), a plurality the of device array (100) (microfluidic modules) adapted to be detachably attached to the bottom cell plate (320) (base board), each having one or more apertures (302) (fluid inlets and/or outlets) (fig. 3), and are coupled together in a liquid-tight seal (plurality of fluid couplings to effect releasable fluid-tight connection) (col.6, lines 14-15) between a device array (100) (microfluidic module) and a center distribution plate (310) (base board) via a aperture (32) (supply aperture) on the center distribution plate (310) (base board) and an apertures (302) (inlet/outlet) on the device array (100)

(microfluidic module), are coupled (fluid coupling) comprising a microchannel (channel means) (col.6, lines 8-15) (302) (insertable into a suitably shaped selectively etched (recess) (col. 7, lines 22) in such an aperture inlet/outlet/aperture) to effect a reagent fluids flow continuously within the microchannels (fluid communication) (col. 5, lines 67 and col. 6, lines 1-2) therebetween.

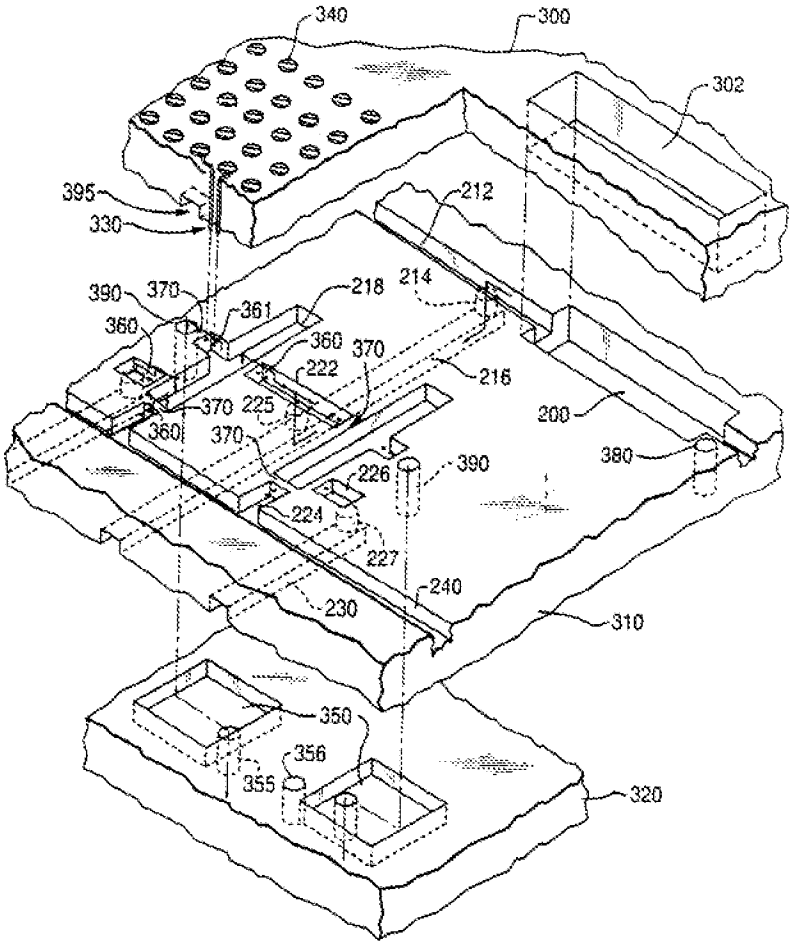


FIG. 3

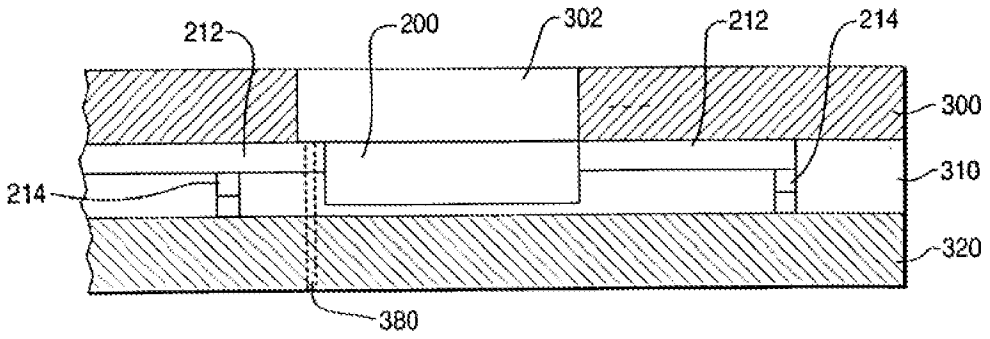


FIG. 5

9. With respect to claim **5**, CHERUKUNI et al. discloses a microelectronic and fluidic array/ device array (100) (modular microfluidic system) wherein the microchannels (212, 216, 218 and 240 fig. 2A) (channel means) have a circular or elliptical cross section (fig. 2A).

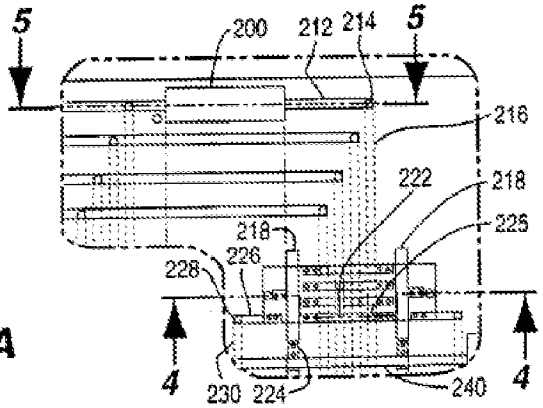


FIG. 2A

10. With respect to claim **6**, CHERUKUNI et al. discloses a microelectronic and fluidic array/ device array (100) (modular microfluidic system) further comprising at least one aperture (302) (fluid source aperture) fluidly linked thereto to supply reagents (source fluid) to the reservoirs (200, 210 and 220) (system) (col.6, lines 52-54 and fig. 2A and fig. 5), and/or at least one aperture (302) (fluid output aperture)

fluidly linked thereto to output fluid from the system (col. 9, lines 58-60) (fig. 3, fig. 4 and fig. 5).

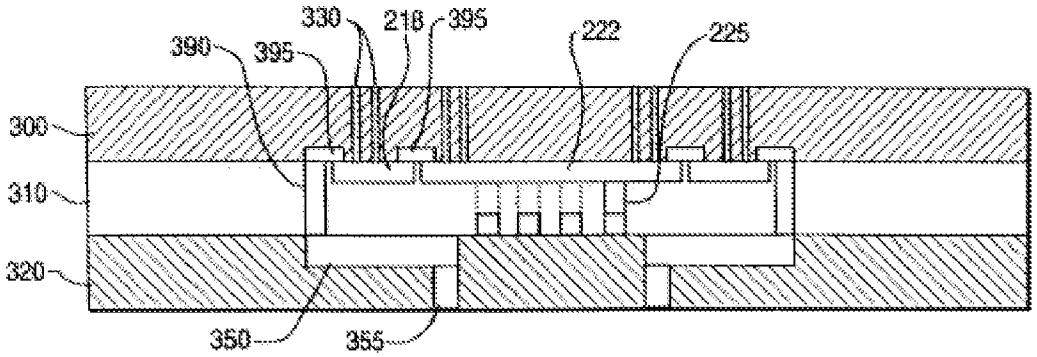


FIG. 4

11. With respect to claim **7**, CHERUKUNI et al. discloses a microelectronic and fluidic array/ device array (100) (modular microfluidic system) wherein the center distribution plate (310) (base board) is constructed with a pattern of interconnecting microchannels (212, 216, 218, 222, 224, 226, 230, 240) (microfluidic channels) (fig. 3) to provide a plurality of fluid microchannels (212, 216, 218, 222, 224, 226, 230, 240) (channels and/or chambers) in use linking in (fluid communication)reagent fluids flow continuously within the microchannels of the of the device array (100) (col. 5, line 67 and col. 6, lines 1-2) at least some of the apertures (302) (supply apertures) to each other and/or to aperture (302) (source aperture) (fig. 3).

12. With respect to claim **10**, CHERUKUNI et al. discloses a microelectronic and fluidic array/ device array (100) (modular microfluidic system) wherein each module has a generally planar construction to be incorporated upon a generally planar feed thru plate, center distribution plate or bottom cell plate (300, 310, 320) (baseboard) (fig. 3, fig. 4 and fig. 4).

13. With respect to claim **15**, CHERUKUNI et al. discloses a microelectronic and fluidic array/ device array (100) (modular microfluidic system) wherein the microchannel (212, 216, 218, 222, 224, 226, 230, and 240) (tubular channel means) includes within a microchannel (fluid channel) therewithin a fluidly active component (col. 5, line 67, col. 6, lines1-2 and fig. 3).

14. With respect to claim **17**, **CHERUKUNI et al.** discloses a microelectric and fluidic array/device array (100) (modular microfluidic system) comprising a plurality of device array (100) (modules), a feedthru plate (300) (base board) and one or more intermediate level plate (310 and 320) (board) constructed in like manner to the feedthru plate (300) (base board), the assembly being adapted for multi-level stacking of plates (300, 310 and 320) (modules and/or base boards and/or intermediate boards) (fig. 3 and fig. 4).

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

16. Claims **2, 11 and 12** are rejected under 35 U.S.C. 103(a) as being unpatentable over CHERUKURI et al. (US 6, 331, 439), in view of BERNDT (US 6, 919, 045).

17. With respect to claim **2**, CHERUKURI et al. does not appear to disclose a channel means comprises a rigid tubular element, with any recess into which such a

tubular element is to be received being shaped accordingly. BERNDT teaches a supply element for a laboratory microchip. BERNDT discloses a microchip (modular microfluidic) system wherein the channels (70, fig. 4A2) (means) comprises a (rigid) tubular element (col. 9, lines 42-45), with any recesses (53, FIG. 3) into which such a channel (tubular element) is to be received being shaped accordingly (col. 8, lines 25-26).

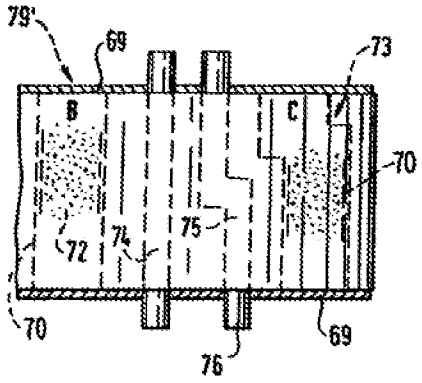
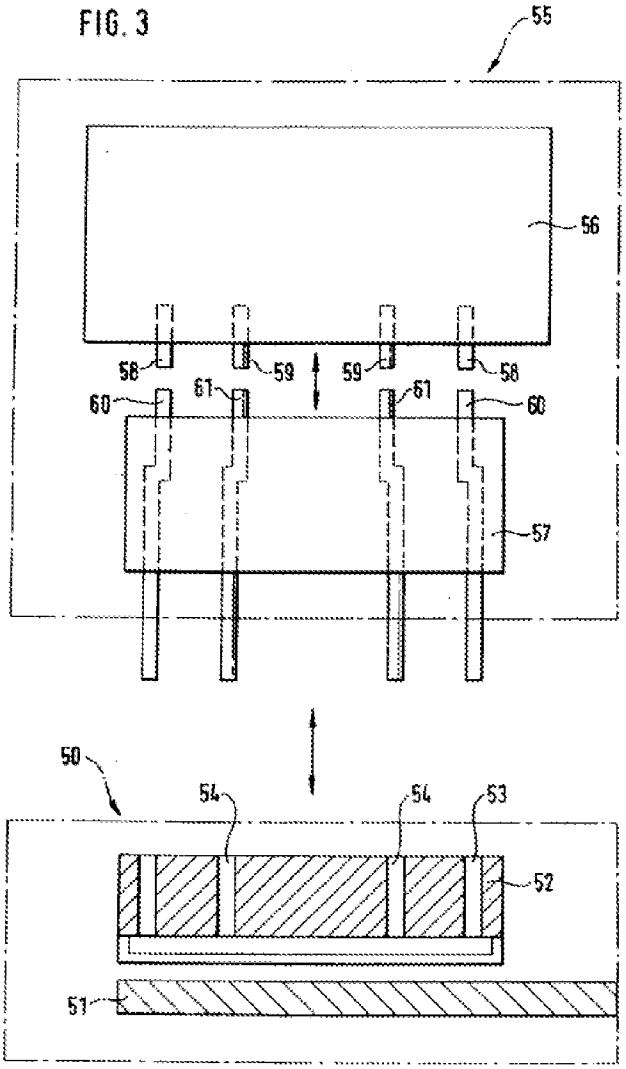


FIG. 4a2

FIG. 3



CHERUKURI et al. and BERNDT are analogous art because they are from the same field of microfluidics, more specifically chemical, biochemical and biological processes.

18. At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the microelectronic and fluidic array/device array of CHERUKURI et al. to include the microchip (modular microfluidic) system wherein the channels

(means) comprises a (rigid) tubular element, with any recesses into which such a channel (tubular element) is to be received being shaped accordingly of BERNDT.

19. The motivation would have been recesses can be provided to accept substances (col.8, lines 5-6) as taught by BERNDT.

20. Therefore, the invention as a whole would have been prima facie obvious to on of ordinary skill in the art at the time the invention was made.

21. With respect to claim **11**, CHERUKUNI et al. as modified by BERNDT. CHERUKUNI et al. discloses a microelectronic and fluidic array/ device array (100) (modular microfluidic system) wherein different parts of plates (boards and/or modules) are fabricated from different materials (col. 6, lines 21-22) to provide different functional materials to provide different functional requirements regarding transparency (col. 6, lines 27-32), structural strength (col. 6, lines 22-23) and the like. CHERUKUNI et al. does not appear to expressly disclose chemical resistance and the like. BERNDT discloses chemically resistant material (chemical resistance) (col. 9, lines 9-10).

CHERUKURI et al. and BERNDT are analogous art because they are from the same field of microfluidics, more specifically chemical, biochemical and biological processes.

22. At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the microelectronic and fluidic array/ device array (100) (modular microfluidic system) wherein different parts of plates (boards and/or modules) are fabricated from different materials to provide different functional materials to provide

different functional requirements regarding transparency, structural strength and the like of CHERUKUNI et al. to include the chemically resistant material (chemical resistance) of BERNDT.

23. The motivation would have been that high quality glasses such as a high melting borosilicate glass or a fused silica are preferred for their ultraviolet transmission properties that use light based technologies (col. 6, lines 27-30) as taught by CHERUKUNI et al.

24. Therefore, the invention as a whole would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

25. With respect to claim **12**, as modified by CHERUKUNI et al. as discussed with respect to claim **11**. Further CHERUKUNI et al. discloses a microelectronic and fluidic array/ device array (100) (modular microfluidic system) wherein a plate (board and/or module) comprises a composite structure (fig. 3, fig. 4 and fig. 5) having areas of a glass (transparent material) where required (col. 6, lines 21-22 and lines 31-32). CHERUKUNI et al. does not appear to expressly disclose areas of a chemically resistant material at least in regions where solvent contact is possible, preventing contact with the less resistant transparent substrate material. BERNDT discloses areas of a chemically resistant material at least in regions where solvent contact is possible, preventing contact with the less resistant transparent substrate material (col. 5, lines 14-16).

26. At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the microelectronic and fluidic array/ device array (modular

microfluidic system) wherein a plate (board and/or module) comprises a composite structure having areas of a glass (transparent material) where required of CHERUKUNI et al. to include the areas of a chemically resistant material at least in regions where solvent contact is possible, preventing contact with the less resistant transparent substrate material of BERNDT.

27. Therefore, the invention as a whole would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

28. Claims **3** and **18** are rejected under 35 U.S.C. 103(a) as being unpatentable over CHERUKURI et al. (US 6, 331, 439) in view of BERNDT (US 6, 919, 045) as applied to claim 2 above, and further in view of BENETT et al. (US 6, 209, 928).

29. With respect to claim **3**, as discussed in claims **2, 11** and **12**, modified CHERUKURI et al. does not appear to disclose the tubular element comprises a projecting ferrule integral with and projecting from a first aperture comprising either a fluid supply aperture in the base board or an inlet/outlet in the module, and adapted to be received in a recess comprised as a second aperture, correspondingly either an inlet/outlet in the module of a supply aperture in the base board. BENETT et al. teaches a microfluidic interconnects. BENETT et al. discloses a microfluidic device (modular microfluidic system) wherein a stiff tubing (14, fig. 1) (tubular element) comprises a ferrule (20) (projecting ferrule integral) with projecting from an opening (22) (first aperture comprising either a fluid supply aperture in the base board or an inlet/outlet in the module), and adapted to be received in a groove (18) (recess)

comprised as a opening (15) (second aperture), correspondingly either an holes (40, 41 and 42, fig. 3) (inlet/outlet) in the module or a hole (40) (supply aperture) in the bottom plate (31) (base board).

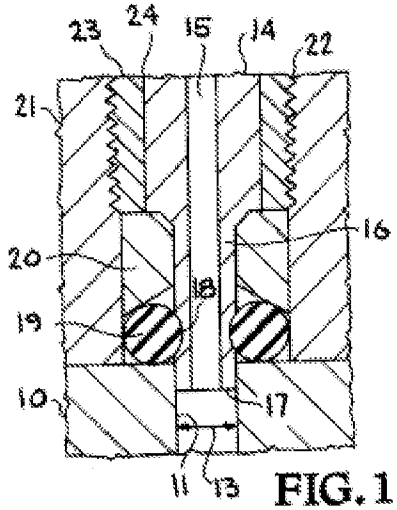


FIG. 1

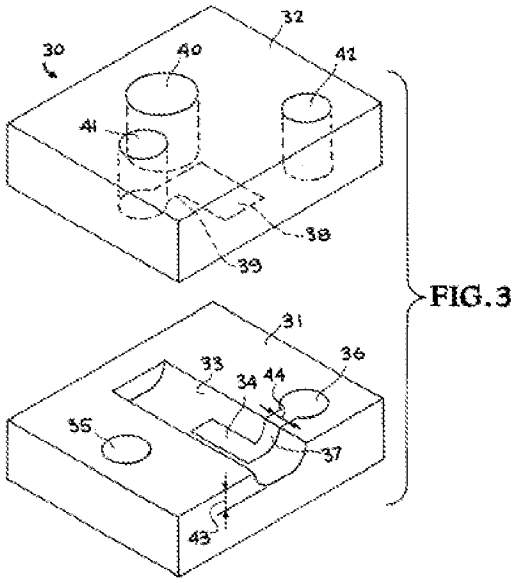


FIG. 3

CHERUKURI et al., BERNDT and BENETT et al. are analogous art because they are from the same field of microfluidics, more specifically chemical, biochemical and biological processes.

30. At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the microelectronic and fluidic array/device array and microchip system of modified CHERUKURI et al. to include the microfluidic device (modular microfluidic system) wherein a stiff tubing (tubular element) comprises a ferrule (projecting ferrule integral) with projecting from an opening (first aperture comprising either a fluid supply aperture in the base board or an inlet/outlet in the module), and adapted to be received in a groove (recess) comprised as a opening (second aperture), correspondingly either an holes (inlet/outlet) in the module or a hole (supply aperture) in the bottom plate (base board) of BENETT et al.

31. The motivation would have been to provide miniature fluidic connectors that utilize stiff tubing wherein the tubing tip is inserted into the microfluidic device and a ferrule and o-ring, two o-rings without a ferrule or molded gasket, engage with formed end of the tubing to create a leakproof seal and mechanically lock the tubing in place (col.2, lines 11-16) as taught by BENETT et al.

32. Therefore, the invention as a whole would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

33. With respect to claim **18**, as discussed in claim **17**, modified CHERUKUNI et al. does not appear to disclose channel means comprising rigid tubular ferules are provided at apertures in the upper surface of the base board and at apertures in the

upper surface of all intermediate level, modules, to be receivingly engaged in fluid tight connection within recessed portions at apertures on the lower surface of all intermediate level components and all top level components. BENETT et al. discloses a microfluidic device (modular microfluidic system) wherein tubing (14) (channel means) comprising ferrules (20) (rigid tubular ferules) are provided at opening (22) (apertures) in the upper surface of the plate (base board) (fig. 1) and at holes (40, 41 and 42) (apertures) in the upper surface of all bottom plate (31) (intermediate level modules), to be receivingly engaged in leakproof seal (fluid tight connection) within recessed portions (col. 2, lines 47-49) at holes (40, 41 and 42) (apertures) on the lower surface of all plates (31 and 32) (intermediate level components and all top level components).

34. At the time of the invention, it would have been obvious to one skilled in the art to modify the microelectronic and fluidic array/device array and microchip system of modified CHERUKURI et al. to include the microfluidic device (modular microfluidic system) wherein tubing (channel means) comprising ferrules (rigid tubular ferules) are provided at opening (apertures) in the upper surface of the plate (base board) and at holes (apertures) in the upper surface of all bottom plate (intermediate level modules), to be receivingly engaged in leakproof seal (fluid tight connection) within recessed portions at holes (apertures) on the lower surface of all plates (intermediate level components and all top level components) of BENETT et al.

35. Therefore, the invention as a whole would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

36. Claims **4**, **8** and **13** are rejected under 35 U.S.C. 103(a) as being unpatentable over CHERUKURI et al. (US 6, 331, 439) in view of BENETT et al. (US 6, 209, 928).

37. With respect to claim **4**, a discussed with respect to claim **1**, CHERUKUNI et al. does not appear to disclose the ferrule projects generally perpendicularly from a generally planar surface of the base board, to effect a fluid connection between a base board, to effect a fluid connection between a base board and module adapted to lie generally when connected. BENETT et al. discloses a microfluidic device (modular microfluidic system) wherein the ferrule (20) projects generally perpendicularly form a planar surface (fig. 1) of the plate (31) (baseboard) (fig. 3), to effect a fluidic connector (fluid connection) (col. 2, lines 20-23) between a plate (31 and 32) (baseboard) and microfluidic device (module) (col. 2, lines 20-23) adapted to lie generally parallel when connected (fig. 3).

CHERUKURI et al. and BENETT et al. are analogous art because they are from the same field of endeavor, microfluidics, more specifically chemical, biochemical and biological processes.

38. At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the microelectronic and fluidic array/device array of CHERUKURI et al. to include the microfluidic device (modular microfluidic system) wherein the ferrule projects generally perpendicularly form a planar surface of the plate (baseboard), to effect a fluidic connector (fluid connection) between a plate

(baseboard) and microfluidic device (module) adapted to lie generally parallel when connected of BENETT et al.

39. The motivation would have been the connector is made using machining, molding, or otherwise forming the end of a stiff tubing, such as polyetheretherbetone (PEEK), so that the tip of the tubing inserts into the microfluidic device and such that a ferrule engage with a formed (grooved) end of the tubing to create a leakproof seal and mechanically lock the tubing in place (col. 2, lines 42-49) as taught by BENETT et al.

40. Therefore, the invention as a whole would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

41. With respect to claim **8**, a discussed with respect to claim **1**, CHERUKUNI et al. does not appear to disclose a where each microfluidic device comprises one or more microfluidic devices. BENETT et al. discloses a microfluidic interconnects (modular microfluidic system) wherein each microfluidic device comprises one or more microfluidic devices (col. 4, lines 22-23).

42. At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the microelectronic and fluidic array/device array of CHERUKURI et al. to include the microfluidic interconnects (modular microfluidic system) wherein each microfluidic device comprises one or more microfluidic devices of BENETT et al.

43. The motivation would have been to provide fluidic connectors applicable to many types of microfluidic devices without redesign, making the connector suitable as

a standard approach for interfacing microfluidic devices to larger fluidic components and to each other (col.1, lines 57-61) as taught by BENETT et al.

44. Therefore, the invention as a whole would have been a *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

45. With respect to claim **13**, a discussed with respect to claim **1**, CHERUKUNI et al. does not appear to disclose connecting means are provided to hold the assembly together in use and assist in maintenance of a fluid-tight connection by urging coupling and aperture into closer association and retaining thereat with a suitable urging force. BENETT et al. discloses a microfluidic device (modular microfluidic system) wherein fluidic connectors (connecting means) (col.2, lines 23-26) are provided to hold the assembly together in use (col. 2, lines 28-32) and assist in maintenance of a fluid-tight connection by urging screwed (coupling) and hole (aperture) into closer association (col.3, lines 4-6) and retaining thereat with a suitable urging pressure (force) (col. 2, lines 26-27).

46. At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the microelectronic and fluidic array/device array of CHERUIKNUI et al. to include the microfluidic device (modular microfluidic system) wherein fluidic connectors (connecting means) are provided to hold the assembly together in use and assist in maintenance of a fluid-tight connection by urging screwed (coupling) and hole (aperture) into closer association and retaining thereat with a suitable urging pressure (force).

47. The motivation would have been the connector is easy to assemble ands disassemble, requiring no tools or adhesives, uses standard tubing , is extremely compact, can be used to make multiple connections in a small area, and requires only simple packaging of microfluidic devices (col.2, lines 28-32) as taught by BENETT et al.

48. Therefore, the invention as a whole would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

49. Claims **14** and **16** are rejected under 35 U.S.C. 103(a) as being unpatentable over CHERUKURI et al. (US 6, 331, 439) in view of BENETT et al. (US 6, 209, 928) as applied to claims **2**, **8** and **13** above, and further in view of JOVANOVICH et al. (US 2001/0007641).

50. With respect to claim **14**, as discussed in claims **2**, **8** and **13**, modified CHERUKUNI et al. does not disclose a modular microfluidic system wherein the removably insertable tubular channel means incorporates or is provided with a closure for closing a pathway not being used in a particular device combination. JOVANOVICH et al. discloses a microfluidic device (modular microfluidic system) wherein the ferrule (removably insertable tubular channel means) incorporates or is provided with a closure for blocking (closing) a capillary (pathway) not being used in a particular device combination (par. 0017, lines 15-19).

51. At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the microfluidic device of modified CHERUKUNI et al. to include

the microfluidic device (modular microfluidic system) wherein the ferrule (removably insertable tubular channel means) incorporates or is provided with a closure for blocking (closing) a capillary (pathway) not being used in a particular device combination of JOVANOVICH et al.

52. The motivation would have been when the ends of the capillaries in both ferrules are aligned the valve is open. If the ferrule of the second member is rotated in relation to the orientation of the first ferrule, the ends of the capillary tubes can be displaced in relation to each other so that non-corresponding solid cylinders, are aligned with the capillaries and the ends of the capillary tubes will be blocked or closed (par. 0017, lines 2-9) as taught by JOVANOVICH et al.

53. Therefore, the invention as a whole would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

54. With respect to claim **16**, as discussed in claims **4**, **8** and **13**, modified CHERUKUNI et al. does not appear to disclose a metal ferrule. JOVANOVICH et al. discloses a microfluidic device (modular microfluidic system) wherein the ferrule (tubular fluid coupling) is (metallic tubular channel coupling such as) typically a metal (ferrule) (par. 0050, line 1) to effect an electrical leads (electrical) (par. 0020, lines 1-5) as well as a fluid communication (par. 0015, lines 5-7). The metal ferrule is a simple substitution of one known element for another to obtain predictable results (MPEP 2143 (b)).

CHERUKURI et al., BENETT et al. and JOVANOVICH et al. are analogous art because they are form the same field of endeavor microfluidics, more specifically

used to introducing fluids to microfluidic devices that are used in chemical, biochemical and biological processes.

55. At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the device array/ microfluidic device (modular microfluidic system) of modified CHERUKUNI et al. to include the microfluidic device (modular microfluidic system) wherein the ferrule (tubular fluid coupling) is (metallic tubular channel coupling such as) typically a metal (ferrule) to effect an electrical leads (electrical) as well as a fluid communication of JOVANOVICH et al.

56. Therefore the invention as a whole would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

57. Claims **9** and **19** are rejected under 35 U.S.C. 103(a) as being unpatentable over CHERUKURI et al. (US 6, 331, 439) in view of BENETT et al. (US 6, 209, 928) as applied to claim **8** above, and in further view of STRAND et al. (US 2002/0176804).

58. With respect to claim **9**, a discussed with respect to claim **8**, modified CHERUKUNI et al. does not appear to disclose wherein the microfluidic devices include devices selected form the list comprising a reactor, heater, cooler, analyser, mixer, separator, or the like, a valve, filter or the like, or a fluid channel, chamber, or manifold. STRAND et al. discloses a microfluidic substrate assembly (modular microfluidic system) wherein the microfluidic devices include devices selected form the list comprising a reactor (par. 0042, line 10), heater (par. 0042, col. 2, line 14),

cooler (par. 0042, col. 2, line 14), analyzer (analyser) (par. 0018, line 10), detector (par. 0042, line 24), mixer (par. 0042, line 9), computer processor (processor) (par. 0004, lines 8), separator (par. 0042, col. 2, line 15), or the like, a pump (par. 0042, line 14), valve (par. 0042, line 12), filter (par. 0042, col. 2, line 6), or the like, or a fluid channel (par. 0055, lines 3-4), chamber (par. 0009, col. 2, line14), or manifold (par. 0036, line1).

CHERUKURI et al., BENETT et al. and STRAND et al. are analogous art because they are from the same field of microfluidics, more specifically fluid-handling substrate devices.

59. At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the microelectronic and fluidic array/device array and microchip system of modified CHERUKURI et al. to include the microfluidic substrate assembly (modular microfluidic system) wherein the microfluidic devices include devices selected form the list comprising a reactor, heater, cooler, analyzer (analyser), detector, mixer, computer processor (processor), separator, or the like, a pump, valve, filter, or the like, or a fluid channel, chamber, or manifold of STRAND et al.

60. The motivation would have been that innumerable components-on-board may be chosen to provide additional functionality to the assemblies (par. 0042, lines 1-4) as taught by STRAND et al.

61. Therefore, the invention as a whole would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention was made.

62. With respect to claim **19**, CHERUKUNI et al. discloses a method of providing a device array (100) (microfluidic system as a modular assembly) comprising of: providing at least one (plate/ center distribution plate (310) (base board) having a plurality of (fluidly linked supply) apertures (302) on one (or both) sides thereof and a plurality of microchannels (212, 216, 218, 222, 224, 226, 2320, 240) (fluid channels and/or chambers) linking in reagent fluids flow continuously within the microchannels (fluid communication) (col. 5, lines 67 and col. 6, lines 1-2) at least some of the (supply) apertures (302) (fig. 3); providing a plurality of device array (100) (microfluidic modules), each having one or more fluid apertures (302) (inlets and/or outlets) and at least one fluid microchannels (212, 216, 218, 222, 224, 226, 2320, 240) (channel or chamber) in reagent fluids flow continuously within the microchannels (fluid communication) (col. 5, lines 67 and col. 6, lines 1-2) therebetween; CHERUKUNI et al. does not appear to disclose a fluid coupling or a recess or a microfluidic circuit. BENETT et al. discloses a ferrule (20) (fluid coupling) comprising a tubing (14) (channel means) insertable into suitably shaped groove (18) (recess) in such a opening (22) (inlet/outlet/aperture) to effect therebetween connecting the microfluidic devices (modules) to the plate (31) (base board) via the ferrule (20) (fluid couplings) to effect releasable leakproof seal (fluid-tight connection) (col. 2, lines 47-49) therebetween via a hole (41) (supply aperture) on the plate (31) (base board) and an opening (22) (inlet/outlet) on the microfluidic device (module); STRAND et al. discloses such that the channel (13 , fig. 1A) (fluid channels or chambers) within the fluid handling device/substrate (5) (modules) act in co-operation

with channel (13) (fluid channels or chambers) in the layer (10) (baseboard) to complete a desire microfluidic device (microfluidic circuit) (par. 0042. lines 10-24 and col.2, lines 6-15).

63. At the time the invention it would have been obvious to one of ordinary skill in the art to modify the device array (microfluidic system as a modular assembly) comprising of: providing at least one (plate/ center distribution plate (base board) having a plurality of (fluidly linked supply) apertures on one (or both) sides thereof and a plurality of microchannels (fluid channels and/or chambers) linking in reagent fluids flow continuously within the microchannels (fluid communication) at least some of the (supply) apertures; providing a plurality of device array (microfluidic modules), each having one or more fluid apertures (inlets and/or outlets) and at least one fluid microchannels (channel or chamber) in reagent fluids flow continuously within the microchannels (fluid communication) therebetween of CHERUKUNI et al. to include the ferrule (fluid coupling) comprising a tubing (channel means) insertable into suitably shaped groove (recess) in such a opening (inlet/outlet/aperture) to effect therebetween connecting the microfluidic devices (modules) to the plate (base board) via the ferrule (fluid couplings) to effect releasable leakproof seal (fluid-tight connection) therebetween via a hole (supply aperture) on the plate (base board) and an opening (inlet/outlet) on the microfluidic device (module) to include the channel (fluid channels or chambers) within the fluid handling device/substrate (modules) act in co-operation with channel (fluid channels or chambers) in the layer (baseboard) to complete a desire microfluidic device (microfluidic circuit) of STRAND et al.

64. The motivation would have been innumerable components-on-board may be chosen to provide additional functionality to the substrate assemblies (par. 0042, lines 1-4) as taught by STRAND et al.

65. Therefore, the invention as a whole would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

Conclusion

66. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The reference BRENNER et al. (US 6, 488, 315) discloses a coupling for microcomponents.

The reference RENZI (US 6, 832, 787) discloses an edge compression manifold.

The reference O'CONNOR et al. (WO 0230560) discloses a fluidic couplers and modular microfluidic systems.

The reference VICTOR, Jr. et al. (US 6, 319, 476) discloses a microfluidic connector.

67. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MONIQUE MIRABEAU whose telephone number is 571-270-5543. The examiner can normally be reached on M-F, alternate F off (8am-4pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Barbara Gilliam can be reached on 571-272-1330. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MM

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